

|                         |                            |                            |                           |                              |                               |                          |                            |                         |
|-------------------------|----------------------------|----------------------------|---------------------------|------------------------------|-------------------------------|--------------------------|----------------------------|-------------------------|
| Gd-147<br>(8.1h)<br>CB+ | Gd-148<br>(74.6y)<br>A     | Gd-149<br>(9.28d)<br>ECB+  | Gd-150<br>(1.79E+6y)<br>A | Gd-151<br>(124d)<br>A        | Gd-152<br>(1.08E+14y)<br>A    | Gd-153<br>(240.4d)<br>EC | Gd-154<br>(STABLE)         | Gd-155<br>(STABLE)      |
| Eu-146<br>(6.1d)<br>CB+ | Eu-147<br>(24.1d)<br>ECB+A | Eu-148<br>(54.5d)<br>ECB+A | Eu-149<br>(9.17d)<br>ECB  | Eu-150m<br>(12.8h)<br>B-ECB+ | Eu-152<br>(13.537y)<br>ECB+B- | Eu-153<br>(STABLE)       | Eu-154<br>(8.593y)<br>B-EC | Eu-155<br>(4.78y)<br>B- |
| Sm-145<br>(340d)<br>C   | Sm-146<br>(1.03E+8y)<br>A  | Sm-147<br>(1.060E11y)<br>A | Sm-148<br>(7E+15y)<br>A   | Sm-150<br>(STABLE)           | Sm-151<br>(90y)<br>B-         | Sm-152<br>(STABLE)       | Sm-153<br>(46.50h)<br>B-   | Sm-154<br>(STABLE)      |

# EUROPIUM-150M

## SUMMARY DATA

### GENERAL

#### CLASSIFICATION

Isotope: Eu-150m  
Atomic number (Z): 63  
Mass number (A): 150  
Neutron number (N): 87

#### RADIOACTIVE DECAY

Decay modes:  $\beta^-$ ,  $\beta^+$ , Electron capture  
Half-life: 12.8 [h]  
Decay constant:  $1.5042 \times 10^{-5}$  [1/s]  
Daughters: Gd-150 (89.0%), Sm-150 (11.0%)  
Radioactive daughters: Gd-150

#### DOSIMETRIC CONSTANTS

Mean alpha energy: 0.0 [MeV]  
Mean electron energy: 0.31218 [MeV]  
Mean photon energy: 0.04935 [MeV]  
Air kerma rate constant,  $\Gamma_{10}$ :  $1.702 \times 10^{-18}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Air kerma coefficient,  $K_{air}$ :  $1.954 \times 10^{-18}$  [Gy  $\cdot$  m<sup>2</sup>/Bq  $\cdot$  s]  
Equilibrium dose constant for weakly-penetrating radiations ( $\alpha$  and/or electrons),  $\Delta_{wp}$ :  $5.002 \times 10^{-14}$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]  
Equilibrium dose constant for alphas,  $\Delta_{\alpha}$ :  $0.000 \times 10^0$  [Gy  $\cdot$  kg/Bq  $\cdot$  s]

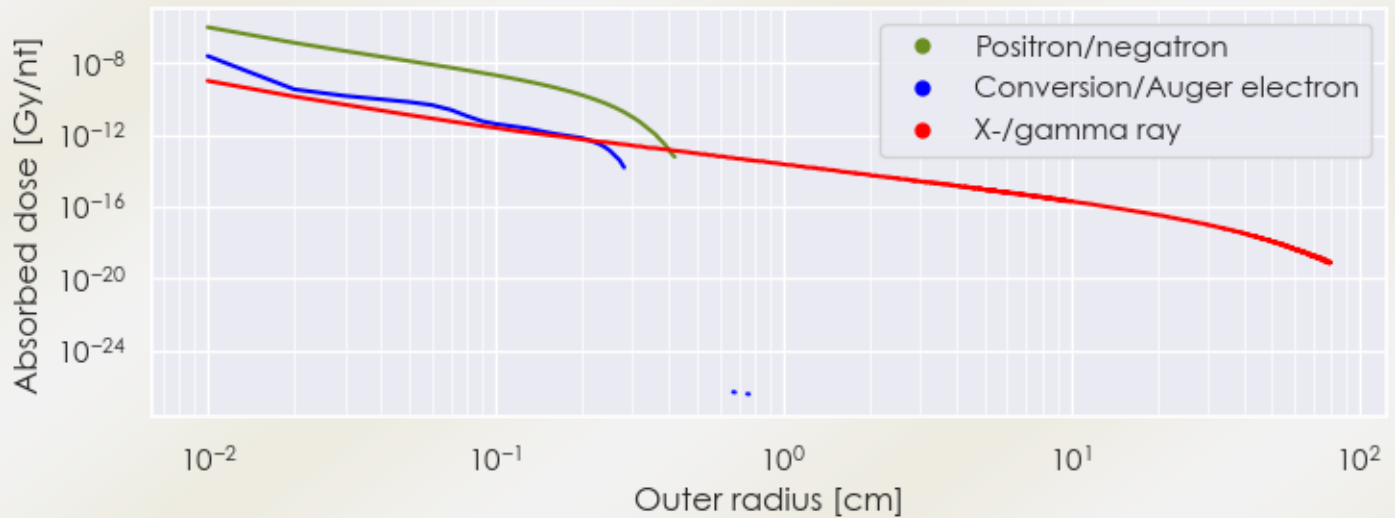
Equilibrium dose constant for betas/electrons,  $\Delta_{\beta, \beta^+, e^-}$ :  $5.002 \times 10^{-14}$  [Gy·kg/Bq·s]

Equilibrium dose constant for photons,  $\Delta_p$ :  $7.907 \times 10^{-15}$  [Gy·kg/Bq·s]

## DOSE POINT KERNELS (PLOT)

Dose point kernel source: **Graves, et al. Medical Physics. 2019 Nov.; 46(11):5284-5293.**

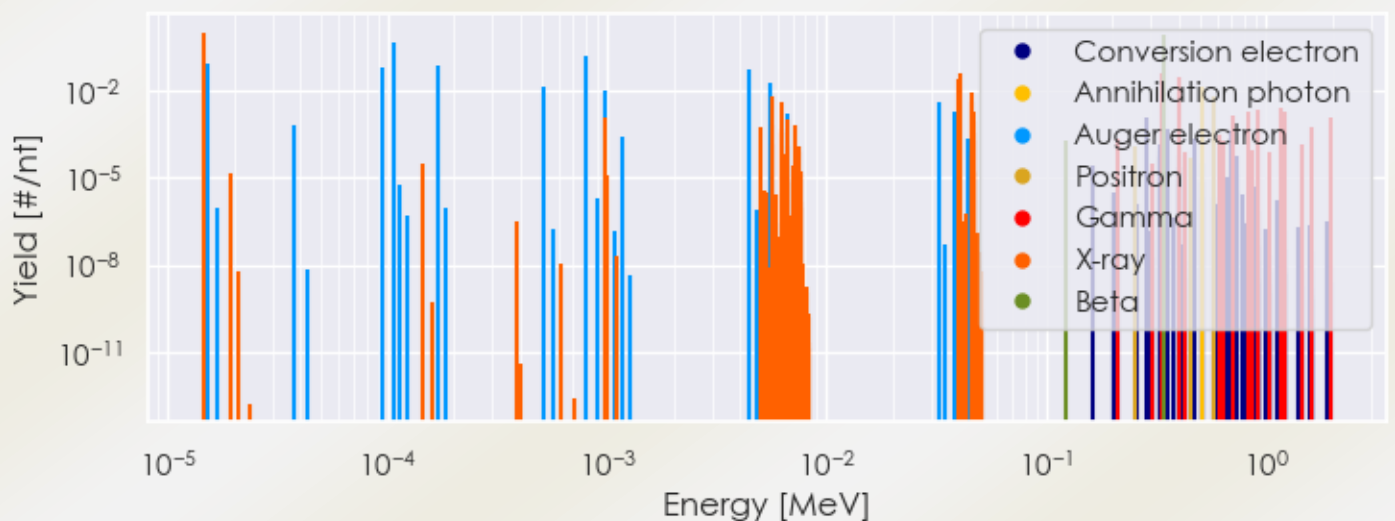
Note: Bins are spaced every 0.1 mm until a radius of 10 cm, and every 1 mm until a radius of 2 m.



Download tabulated dose point kernel file here: [www.mirdsoft.org/products/MIRDspecs/Eu-150m DPK.csv](http://www.mirdsoft.org/products/MIRDspecs/Eu-150m DPK.csv)

## SUMMARY SPECTRA (PLOT)

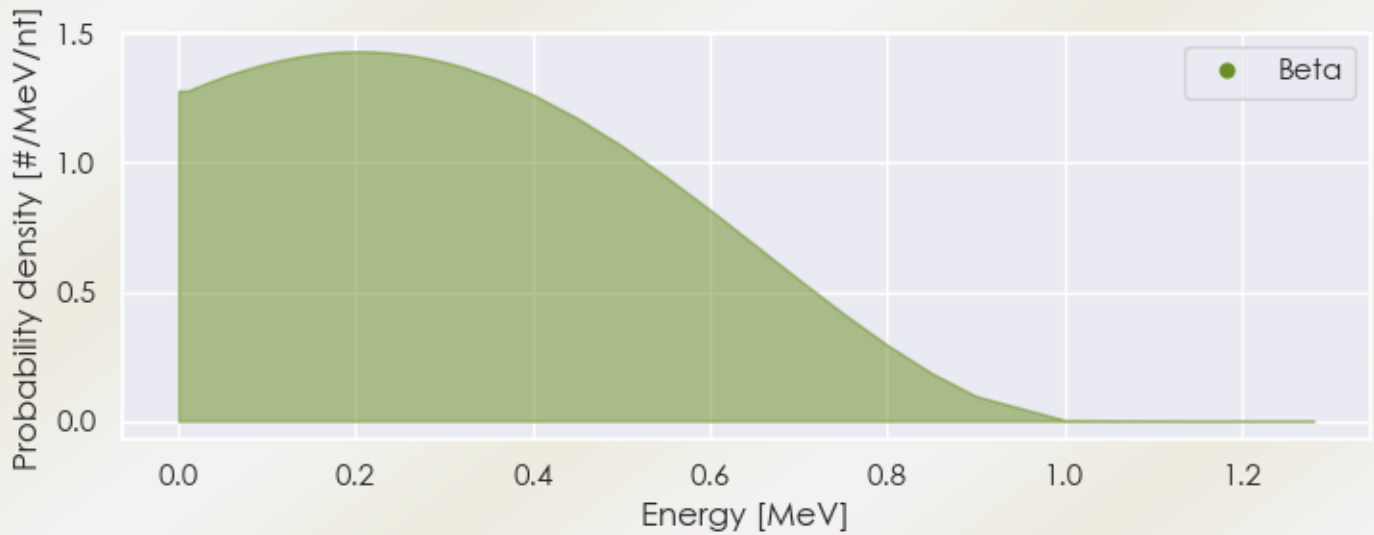
Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Eu-150m Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Eu-150m Summary Spectrum.csv)

## BETA SPECTRA (PLOT)

Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**



Download tabulated beta spectra file here: [www.mirdsoft.org/products/MIRDspecs/Eu-150m Beta Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Eu-150m Beta Spectrum.csv)

## TABULATED DATA

### SUMMARY SPECTRA (TABLE)

Spectra source: **ICRP Publication 107: Nuclear Decay Data for Dosimetric Calculations. Ann. ICRP 2008, 38 (3).**

Note: Radiations with yield < 0.01 are excluded from the table, but are available in the linked \*.csv data.

Download tabulated summary spectra file here: [www.mirdsoft.org/products/MIRDspecs/Eu-150m Summary Spectrum.csv](http://www.mirdsoft.org/products/MIRDspecs/Eu-150m Summary Spectrum.csv)

| Energy [MeV] | Yield [# /nt] if > 0.01 | Radiation type      |
|--------------|-------------------------|---------------------|
| 1.45270e-05  | 1.040e+00               | X-ray               |
| 3.95578e-02  | 2.379e-02               | X-ray               |
| 4.01680e-02  | 4.306e-02               | X-ray               |
| 3.33900e-01  | 3.960e-02               | Gamma               |
| 4.06500e-01  | 2.812e-02               | Gamma               |
| 5.11000e-01  | 1.303e-02               | Annihilation photon |
| 3.44352e-01  | 8.898e-01               | Beta                |
| 1.51033e-05  | 8.138e-02               | Auger electron      |
| 9.42983e-05  | 6.656e-02               | Auger electron      |

|                    |           |                                |
|--------------------|-----------|--------------------------------|
| <b>1.06709e-04</b> | 4.350e-01 | <a href="#">Auger electron</a> |
| <b>1.68903e-04</b> | 6.951e-02 | <a href="#">Auger electron</a> |
| <b>5.09284e-04</b> | 1.383e-02 | <a href="#">Auger electron</a> |
| <b>8.03810e-04</b> | 1.491e-01 | <a href="#">Auger electron</a> |
| <b>4.45853e-03</b> | 5.553e-02 | <a href="#">Auger electron</a> |
| <b>5.50868e-03</b> | 1.898e-02 | <a href="#">Auger electron</a> |

## USEFUL LINKS

Isotope decay characteristics are periodically updated as better measurements can be made - changes that may not be reflected on this page. Please see useful links:

National Nuclear Data Center (NNDC): <https://www.nndc.bnl.gov/nudat3/mird/>

International Atomic Energy Agency (IAEA) Livechart: <https://www-nds.iaea.org/relnsd/vcharthtml/VChartHTML.html>

## REFERENCE LINKS

ICRP Report 107: <https://www.icrp.org/publication.asp?id=ICRP%20Publication%20107>

Graves et al. Dose Point Kernels: <https://doi.org/10.1002/mp.13789>

MIRD Decay Schemes 2nd Edition: [https://sites.snmmi.org/SNMML-MAIN/iCore/Store/StoreLayouts/Item\\_Detail.aspx?iProductCode=0-932004-80-6](https://sites.snmmi.org/SNMML-MAIN/iCore/Store/StoreLayouts/Item_Detail.aspx?iProductCode=0-932004-80-6)